

GÉANT Support for Research Within and Beyond Europe

**TNC 2003,
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AGENDA

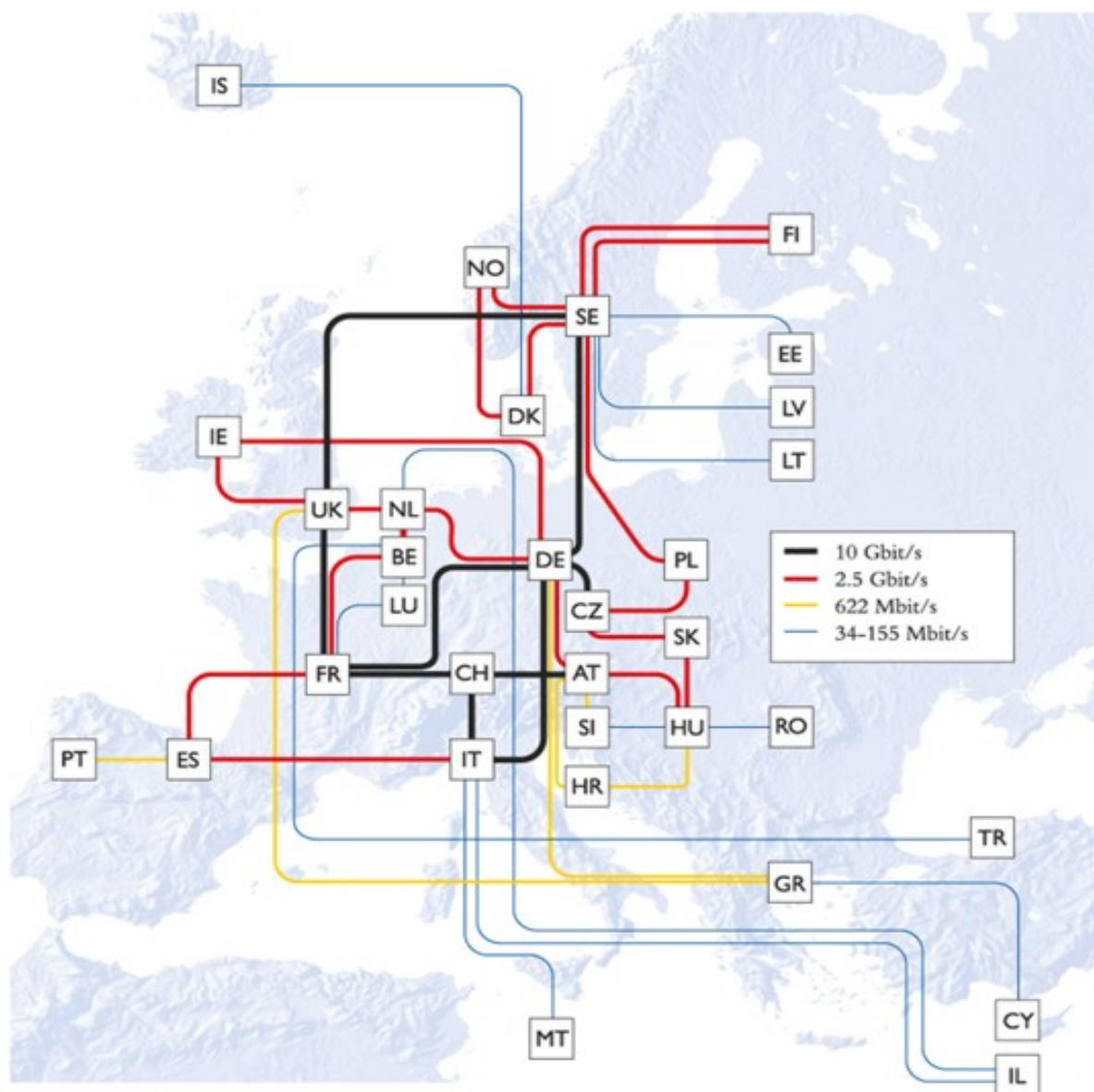
- **GÉANT Global Research Connectivity**
 - Europe, North America and other regions
- **GÉANT services**
- **GÉANT Projects support: GRID Application**

What is GÉANT ?

- **Pan-European Network connecting 28 NRENs from across Europe**
- **Jointly funded by NRENs and EC**
- **Based on 10Gbps capacity, using mainly Juniper routers**
- **Global Research connectivity**
 - **US, Canada, Japan**
- **Platform for development and deployment of advanced services (QoS, IPv6, MPLS)**

Multi-Gigabit pan-European Research Network

Backbone Topology December 2002



- Connecting 32 European Countries and 28 NRENs
- Backbone capacity in the range of:
34Mb/s-10Gb/s

Global Research Connectivity

- **3 x 2.5Gbps connectivity between Europe (AT, DE, UK) and US (NYC, DC)**
 - **Interconnections with Abilene, CA*net4, ESNET, SINET**
- **NSF funded initiative to provide 2 x 2.5Gbps between Chicago and Amsterdam**
- **155Mbps connection London-Tokyo**

Other Regions

- **New access to Russia**
- **South America (ALICE project)**
- **Mediterranean (EUMEDCONNECT project)**
- **South-East Europe (SEEREN project)**

The ALICE Project

“America Latina Interconectada Con Europa”

The objective of ALICE is to create a regional Latin American research networking infrastructure and its interconnection to GEANT. The ALICE project is co-funded by the European Commission.

Possible Latin American network topology



- Major connectivity between AR, BR, CL, MX (at least 45 Mbps)
- Other countries connect to major nodes (between 10 and 45 Mbps)
- Connectivity to Europe at least 155 Mbps end 2003
- Topology dependent on result of the ALICE tender
- Sustainability after 2006 to be ensured by CLARA (Cooperacion Latino Americana de Redes Avanzadas)

EUMEDCONNECT

- **NREN's in Argelia, Cyprus, Egypt, Israel, Jordan, Lebanon, Malta, Morocco, Palestinian Authority, Syria, Tunisia, Turkey**
- **Project Partners DANTE (UK), GARR (Italy), GRNET (Greece), RedIRIS (Spain), RENATER (France)**
- **Project supported by EC EUMEDIS programme**

How do we get there?

- **Topology to be agreed during tender negotiations**
- **Initial topology could include:**
 - **Direct MED-NREN connections to GÉANT**
 - **Satellite links**
 - **“local hubs”**
- **Timescales: Tender currently underway**
Service from late 2003-2006

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The Services

- **Best Efforts IP**
- **Premium IP**
- **LBE (scavenger)**
- **Multicast**
- **MPLS-based VPNs**
- **IPv6**
- **Interdomain Performance Monitoring**

Use of Premium IP

- **Separate IST project (SEQUIN) for the definition of Premium IP**
- **Validated, deployed on GEANT**
- **Based on diffserv-EF**
- **IST projects AQUILA, MOICANE, LONG**
- **Request for and configuration is not yet automated**
 - ongoing work
- **<http://www.dante.net/nep/geantqos/premiumip.html>**

Use of L2 VPN

- **Provision of emulated switched point to point connections, using Juniper MPLS/CCC**
- **6NET: STM-1 between Germany and Greece**
- **ATRIUM: STM-16 between Poland and France**
- **DATATAG: 1GE between CERN and Italy**

IPv6: Roll-out plan

- **GÉANT v6 Core Configuration – February 2003** ✓
- **First Connections – April 2003** ✓
- **Pilot service – June 2003**
- **IPv6 production service – October 2003**

IPv6 Design

- One IGP => IS-IS handling v4 and v6 routes
 - With a congruent topology for both protocols
- BGP Design => One TCP session for v4 and v6?
 - Advantage: TCP sessions not duplicated
 - Disadvantage: Next hop chosen by IPv6 NLRI is derived from the IPv4 address => Not real IPv6 address exchanged by IGP. Use static routes!
 - Two TCP sessions!!

Addressing Plan

- 2001:0798/32 has been allocated by RIPE
 - 2001:0798:0/35 for 6NET
 - **2001:0798:2/35 for GEANT**
 - 2001:0798:4/35=> For delegation of /40 and /48 for projects
 - 8 ranges of /36 reserved for NRNs delegation
 - 2001:0798:E/35 => reserved for Migration

Current Status

- GÉANT core dual stack
- Already connected
 - **RedIRIS, RENATER, FCCN, SURFnet, HEANET, GARR, LITNET and Abilene**
- Next days
 - **Rest of NRENs**

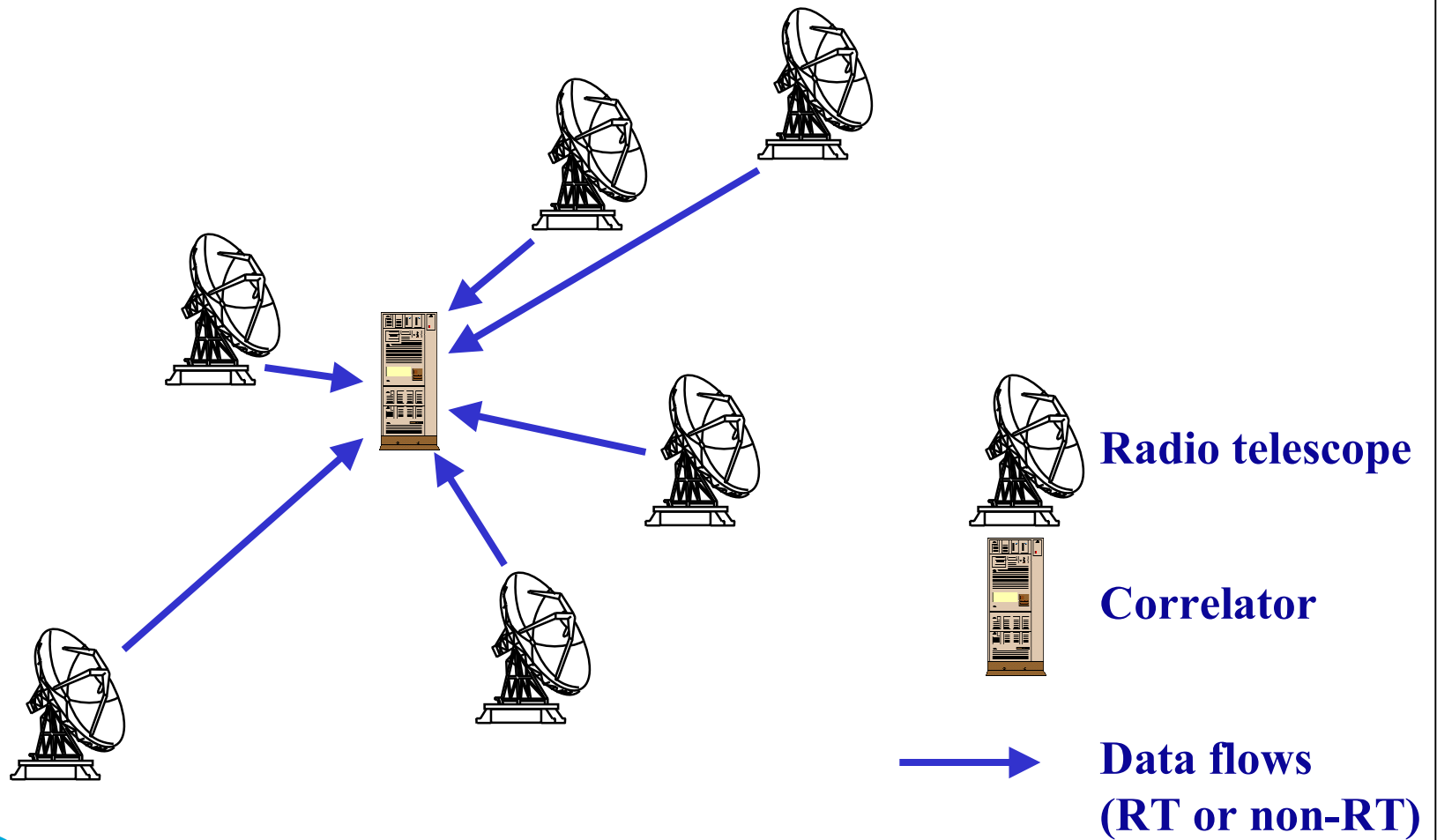
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Largest GRID Application on GÉANT yet

- **VLBI - Very Long Baseline Interferometry**
 - e-VLBI - Real-time VLBI done using network interconnectivity
- **EVN - European VLBI Network**
 - 14 radio telescopes in Europe
 - plus others further afield
- **JIVE - Joint Institute for VLBI in Europe**
 - hosts Mk IV correlator (dedicated supercomputer)
 - JIVE hosted by ASTRON at Dwingeloo in The Netherlands
- See <http://www.evlbi.org>

What is VLBI?

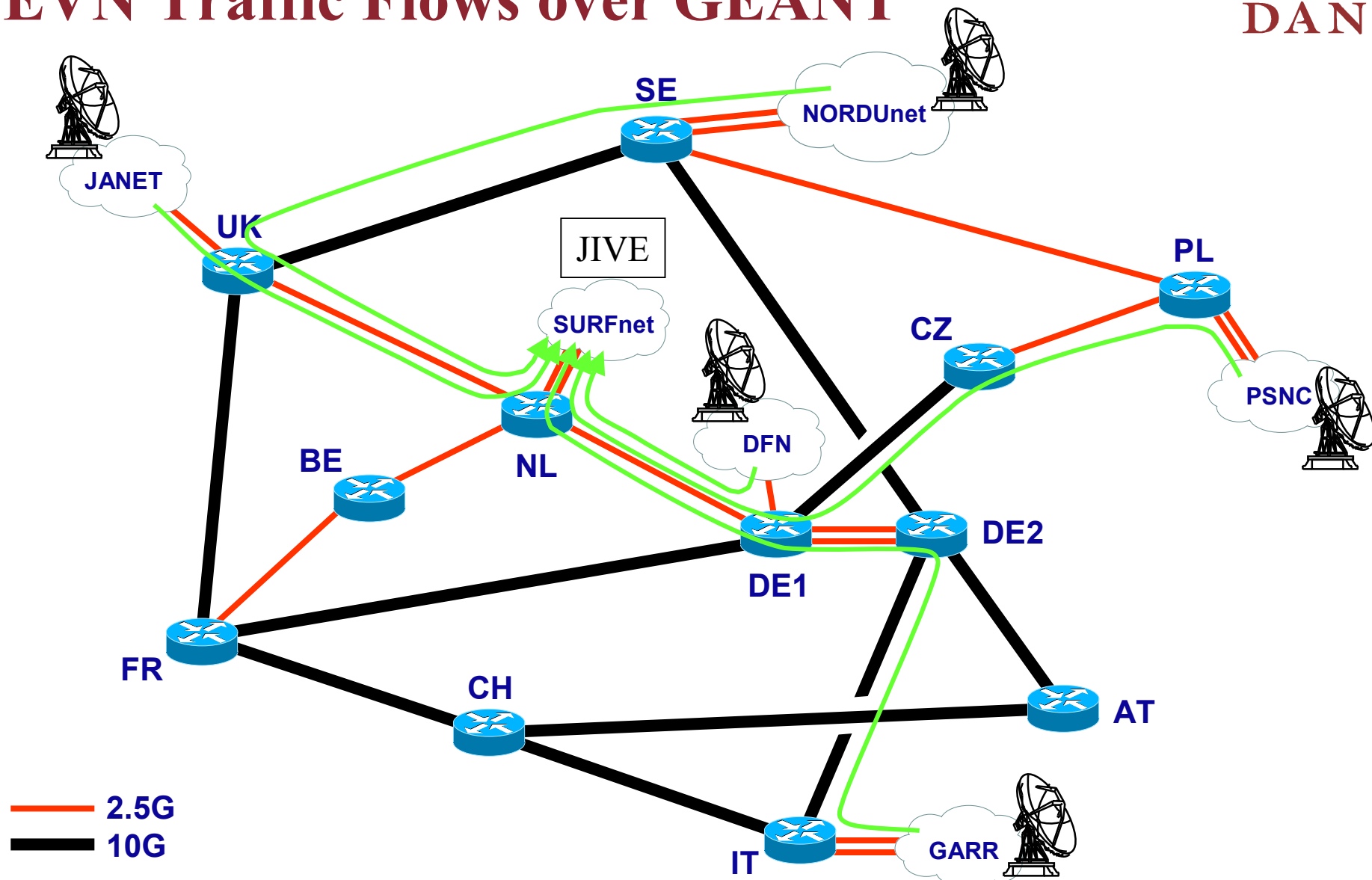


Current arrangement uses tapes...

- **Tape technology nearing EOL**
 - One supplier left
 - \$1200 per tape
 - Drives no longer available
- **Expensive logistics**
- **Effectively limits bit rates**
 - Hence limits resolution
- **Slow turn around time**
 - Real-time measurement not possible
 - Inflexible duty cycles



EVN Traffic Flows over GÉANT



Who is supporting the PoC?

- **Radio astronomy community (EVN)**
 - JIVE
 - **Radio telescope sites:**
 - Westerbork (NL)
 - Effelsberg (DE)
 - Onsala Space Observatory (SE)
 - Medicina (IT)
 - Jodrell Bank (UK)
 - Torun (PL)
- **NRENs**
 - GARR, UKERNA, DFN, NORDUnet (SUNET), PSNC
 - SURFnet (all roads lead to Dwingeloo!)
- **DANTE**

BACK

- *References*

- *DANTE:*

- operations@dante.org.uk, nep@dante.org.uk

- <http://www.dante.net/nep/ipv6/index.html>

- GEANT V6 task force:

- geantv6@dante.org.uk

- <http://www.join.uni-muenster.de/geantv6/>



Thank You

